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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/792,313	03/02/2004	Ivan Tashev	MCS-005-04 (305886.01)	4390
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MICROSOFT CORPORATION			MONIKANG, GEORGE C	
C/O LYON & HARR, LLP			ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/792,313	TASHEV ET AL.
	Examiner	Art Unit
	George C. Monikang	2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 02 March 2004.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-35 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 3/2/2004.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3-7, 9, 15-16, 18-20, 22 & 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nordholm et al, ADAPTIVE MICROPHONE ARRAY EMPLOYING CALIBRATION SIGNALS: An Analytical Evaluation (IEEE). (This reference is cited in IDS filed 3/2/2004)

Re Claim 1, Nordholm et al disclose a method for real-time design of beam sets for a microphone array from a set of pre-computed noise models (*fig. 3*), comprising using a computing device to: compute a set of complex-valued gains for each subband of a frequency-domain decomposition of microphone array signal inputs for each of a plurality of beam widths within a range of beam widths (*pg 242: Working Scheme for the Adaptive Beamformer*), search the sets of complex-valued gains to identify a single set of complex-valued gains for each frequency-domain subband and for each of a plurality of target focus points around the microphone array (*fig. 3: Upper Beamformer; pg 243, col. 1: second paragraph*); and wherein each said set of complex-valued gains is individually selected as the set of complex-valued gains having a lowest total noise energy relative to corresponding sets of complex-valued gains for each frequency-domain subband for each target focus point around the microphone array (*fig. 3: Upper*

Beamformer output; pg 243, col. 2: first paragraph), and wherein each selected set of complex-valued gains is then provided as an entry in said beam set for the microphone array (fig. 3: Lower Beamformer).

Claim 1 further recites "Said sets of complex-valued gains being computed from the pre-computed noise models in combination with known geometry and directivity of microphones comprising the microphone array." Nordholm et al does not explicitly disclose gains computed from precomputed noise models in combination with known geometry directivity as claimed. Official notice is taken that both the concepts and advantages of computing gains computed from precomputed noise models in combination with known geometry directivity is well known in the art. It would have been obvious to use a pilot signal beamformer as stated in Nordholm et al (page 241, col. 2, 3rd paragraph) where information about signal statistics or array geometry are required to chose the placement of microphone elements.

Re Claim 3, which further recites "The method of claim 1 wherein the frequency-domain decomposition is a Fast Fourier Transform (FFT)." Nordholm et al does not explicitly disclose a fast fourier transform (FFT) as claimed. Official notice is taken that both the concepts and advantages of using a FFT are well known in the art. It would have been obvious to use a FFT since it is efficient in computing discrete fourier transforms and its inverse.

Re Claim 4, Nordholm et al discloses the method of claim 1 wherein the pre-computed noise models include ambient noise models (page 243, col. 2, paragraph 2: background noise).

Re Claim 5, Nordholm et al discloses the method of claim 4 wherein the ambient noise models are computed by direct sampling and averaging of isotropic noise in a workspace around the microphone array (page 242, col. 2, paragraph 2).

Re Claim 6, Nordholm et al discloses the method of claim 4 wherein the instrumental noise models are computed by direct sampling and averaging of the output of the microphones in the microphone array in a workspace without noise and reverberation, so that only those noises originating from the circuitry of the microphone array is sampled (page 242, col. 1, paragraph 1: Working Scheme for the Adaptive Beamformer).

Re Claim 7, Nordholm et al discloses the method of claim 1 wherein the total noise energy is computed as a function of the pre-computed noise models and the beam widths in combination with the corresponding sets of complex-valued gains (fig. 3: jammer, target & lower beamformer; page 246-247, section A & B).

Re Claim 9, which further recites, "Wherein the sets of complex-valued gains are normalized to ensure unit gain and zero phase shift for signals originating from each target focus point." Nordholm et al does not explicitly disclose normalization as claimed. Official notice is taken that both the concepts and advantages of normalizing are well known in the art. It would have been obvious to normalize the gains since normalization is used to adjust the gains of signals to a standard level.

Claim 15 has been analyzed and rejected according to claims 1 & 9.

Claim 16 has been analyzed and rejected according to claims 1 & 9.

Claim 18 has been analyzed and rejected according to claims 1, 3 & 9.

Claim 19 has been analyzed and rejected according to claims 1, 4 & 9.

Claim 20 has been analyzed and rejected according to claims 1 & 9.

Claim 22 has been analyzed and rejected according to claims 1 & 9.

Claim 26 has been analyzed and rejected according to claim 1.

Claim 27 has been analyzed and rejected according to claim 9.

Claim 28 has been analyzed and rejected according to claim 1.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 2, 8, 14, 17, 21, 25, 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nordholm et al, ADAPTIVE MICROPHONE ARRAY EMPLOYING CALIBRATION SIGNALS: An Analytical Evaluation (IEEE) as applied to claim 1 above, in view of Malvar, US Patent 6,496,795 B1. (These references are cited in IDS filed 3/2/2004)

Re Claim 2, Nordhold et al discloses the method of claim 1 but fails to disclose wherein the frequency-domain decomposition is a Modulated Complex Lapped Transform (MCLT). However, Malvar does (abstract).

Taking the combined teachings of Nordholm et al and Malvar as a whole, one skilled in the art would have found it obvious to modify the method of Nordholm et al with wherein the frequency-domain decomposition is a Modulated Complex Lapped Transform (MCLT) as taught in Malvar (abstract) to explicitly represent the phase/complex values of the signal.

Re Claim 8, Nordholm et al discloses the method of claim 1 but fails to disclose wherein at least one member of the set of pre-computed noise models is recomputed in real-time in response to changes in noise levels around the microphone array. However, Malvar does (col. 19, lines 50-57).

Taking the combined teachings Nordholm et al and Malvar as a whole, one skilled in the art would have found it obvious to modify the method of Nordholm et al with wherein at least one member of the set of pre-computed noise models is recomputed in real-time in response to changes in noise levels around the microphone array as taught in Malvar (col. 19, lines 50-57) so that the system can be operated in real time.

Claim 14 has been analyzed and rejected according to claims 1 & 8.

Claim 17 has been analyzed and rejected according to claims 1, 2 & 9.

Claim 21 has been analyzed and rejected according to claims 1, 8 & 9.

Claim 25 has been analyzed and rejected according to claims 1, 8 & 9.

Claim 29 has been analyzed and rejected according to claims 2 & 3.

Re Claim 30, Nordholm et al discloses the computer readable medium of claim 26 further comprising a beamforming processor for applying the set of steerable beams for processing output signals of the microphone array (*fig. 3: upper beamformer*).

Claims 10-11 & 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nordholm et al, ADAPTIVE MICROPHONE ARRAY EMPLOYING CALIBRATION SIGNALS: An Analytical Evaluation (IEEE) as applied to claim 1 above, in view of Gordin et al, US Patent 4,729,077.

Re Claim 10, Nordholm et al discloses the method of claim 1 but fails to disclose wherein the range of beam widths is defined by a pre-determined minimum beam width, a pre-determined maximum beam width, and a pre-determined beam width step size. However, Gordin et al does (*col. 1, lines 36-46*).

Taking the combined teachings of Nordholm et al and Gordin et al as a whole, one skilled in the art would have found it obvious to modify the method of Nordholm et al with wherein the range of beam widths is defined by a pre-determined minimum beam width, a pre-determined maximum beam width, and a pre-determined beam width step size as taught in Gordin et al (*col. 1, lines 36-46*) to provide variable beams.

Claim 11 has been analyzed and rejected according to claim 10.

Claim 23 has been analyzed and rejected according to claims 1, 9 & 10.

Claims 12-13 & 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nordholm et al, ADAPTIVE MICROPHONE ARRAY EMPLOYING CALIBRATION

SIGNALS: An Analytical Evaluation (IEEE) as applied to claim 1 above, in view of Aoe et al, US Patent 5,479,614.

Re Claim 12, Nordholm et al discloses the method of claim 1 wherein the known geometry and directivity of the microphones comprising the microphone array (claim 1 rejection) but fails to disclose provided from a device description file which defines operational characteristics of the microphone array. However, Aoe et al does (col. 13, lines 48-57).

Taking the combined teachings of Nordholm et al and Aoe et al as a whole, one skilled in the art would have found it obvious to modify the method wherein the known geometry and directivity of the microphones comprising the microphone array of Nordholm et al with provided from a device description file which defines operational characteristics of the microphone array as taught in Aoe et al (col. 13, lines 48-57) so distributed processing of the system can be realized.

Claim 13 has been analyzed and rejected according to claim 12.

Claim 24 has been analyzed and rejected according to claims 1, 9 & 12.

Claims 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nordholm et al, ADAPTIVE MICROPHONE ARRAY EMPLOYING CALIBRATION SIGNALS: An Analytical Evaluation (IEEE) and Malvar, US Patent 6,496,795 B1 as applied to claim 30 above, in further view of applicants admitted prior art, (AAPA, para 0005).

Re Claim 31, the combined teachings of Nordholm et al and Malvar discloses the computer readable medium of claim 30 but fails to disclose wherein the beamforming processor comprises a sound source localization (SSL) system for using the optimized set of steerable beams for localizing audio signal sources within an environment around the microphone array. However, AAPA does (para 0005).

Taking the combined teachings of Nordholm et al, Malvar and AAPA as a whole, one skilled in the art would have found it obvious to modify the computer readable medium of Nordholm et al and Malvar with wherein the beamforming processor comprises a sound source localization (SSL) system for using the optimized set of steerable beams for localizing audio signal sources within an environment around the microphone array as taught in AAPA (para 0005) for localizing the source of the sound waves and reducing noise.

Re Claim 32, the combined teachings of Nordholm et al, Malvar and AAPA disclose the computer readable medium of claim 31 wherein the beamforming processor comprises an acoustic echo cancellation (AEC) system for using the optimized set of steerable beams for canceling echoes outside of a particular steered beam (Nordholm et al, page 243, paragraph 2: echo cancellation).

Re Claim 33, the combined teachings of Nordholm et al, Malvar and AAPA disclose the computer readable medium of claim 31 wherein the beamforming processor comprises a directional filtering system for selectively filtering audio signal sources relative to the target focus point of one or more steerable beams (Nordholm et al, page 242, section A: Description of the Calibration Phase).

Claim 34 has been analyzed and rejected according to claim 33.

Claim 35 has been analyzed and rejected according to claims 31-33.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George C. Monikang whose telephone number is 571-270-1190. The examiner can normally be reached on M-F. alt Fri. Off 7:30am-5:00pm (est).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chin Vivian can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

George Monikang

7/22/2007


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